

irradiating a surface of an object to be measured with an irradiation light, said irradiation light being reflected from a light source onto the surface of the object to be measured to form a reflected light;

making a component of said reflected light, parallel with an optical axis of an objective lens provided oppositely to the object to be measured, incident on a slit through said objective lens to form an incident light;

21
contd. switching over an illumination switchover means provided in a light path between said light source and the object to be measured, wherein said illumination switchover means is structurally configured to be switched over between a bright-field illumination, using a half-mirror portion, in which said light from said light source is made parallel with said optical axis of said objective lens and applied to the object to be measured through said objective lens, and a dark-field illumination, in which said light from said light source is made ringlike and applied obliquely with respect to said optical axis of said objective lens such that there is a focus on the surface of the object to be measured, wherein an angle at which a difference from the normal position is obviously observed with the naked eye is selected, and bright-field illumination is used when the angle is zero degrees and dark-field illumination is used when the angle is an angle other than zero degrees;

receiving only a component of said incident light having passed through an opening of said slit to form a received light;

obtaining a light quantity of said received light; and

controlling a light detection extent in the surface of the object to be measured by changing a size of said opening of said slit to be within a range of approximately 0.2 mm to approximately 30 mm and by changing a magnification of said objective lens.--

9. (Canceled).

10. (Canceled).

82

--11. (Thrice Amended) A surface inspection method comprising the steps of:

irradiating a surface of an object to be measured with a light to form an irradiation light;

reflecting said irradiation light on the surface of the object to be measured to form a reflected light;

making only a component in almost one direction incident on a slit through a tubular member in the reflected light to form an incident light;

switching over an illumination switchover means provided in a light path between said light source and the object to be measured, wherein said illumination switchover means is structurally configured to be switched over between a bright-field illumination, using a half-mirror portion, in which said light from said light source is made parallel with said optical axis of said objective lens and applied to the object to be measured through said objective lens, and a dark-field illumination, in which said light from said light source is made ringlike and applied obliquely with respect to said optical axis of said objective lens such that there is a focus on the surface of the object to be measured, wherein an angle at which a difference from the normal position is obviously observed with the naked eye is selected, and bright-field illumination is used when the angle is zero degrees and dark-field illumination is used when the angle is an angle other than zero degrees;

obtaining only a component of a light quantity through an opening of said slit in said incident light; and

controlling a light detection extent in the surface of the object to be measured by changing a size of said opening of said slit to be within a range of approximately 0.2 mm to approximately 30 mm and by changing a magnification of said objective lens.

12. (Thrice Amended) A surface inspection method comprising the steps of:

irradiating a surface of an object to be measured with a light to form an irradiation light;

reflecting said irradiation light on the surface of the object to be measured to form a reflected light;

making said reflected light incident on a slit through an optical fiber cable to form an incident light;

switching over an illumination switchover means provided in a light path between said light source and the object to be measured, wherein said illumination switchover means is structurally configured to be switched over between a bright-field illumination, using a half-mirror portion, in which said light from said light source is made parallel with said optical axis of said objective lens and applied to the object to be measured through said objective lens, and a dark-field illumination, in which said light from said light source is made ringlike and applied obliquely with respect to said optical axis of said objective lens such that there is a focus on the surface of the object to be measured, wherein an angle at which a difference from the normal position is obviously observed with the naked eye is selected, and bright-field illumination is used when the angle is zero degrees and dark-field illumination is used when the angle is an angle other than zero degrees;

obtaining a light quantity of only a component having passed through an opening of said slit in said incident light; and

controlling a light detection extent in the surface of the object to be measured by changing a size of said opening of said slit to be within a range of approximately 0.2 mm to approximately 30 mm and by changing a magnification of said objective lens.--

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REMARKS

Favorable reconsideration of this application, as presently amended and in light of the following discussion, is respectfully requested.

Claims 5, 7, 8, 11, and 12 remain pending in this application, claims 1, 4, 9, and 10 having been canceled, without prejudice or disclaimer, and claims 5, 11, and 12 having been amended, by the present amendment.

In the outstanding Office Action, claims 1, 4, 9, and 10 were rejected under 35 U.S.C. § 103(a) as being unpatentable over *Shiraishi*, and claims 5, 7, 8, 11, and 12 were rejected under 35 U.S.C. § 103(a) as being unpatentable over *Shiraishi* and *Haga* and *Worster et al.*

Applicants have canceled apparatus claims 1, 4, 9, and 10, without prejudice or disclosure, and have amended independent method claims 5, 11, and 12 for clarity. More particularly, independent method claims 5, 11, and 12 have been amended to recite that an angle at which a difference from the normal portion is obviously observed with the naked eye is selected, and bright-field illumination is used when the angle is zero degrees and dark-field illumination is used when the angle is an angle other than zero degrees. Support for this amendment can be found on page 24, lines 1 through 6, of the present specification.

As a quick synopsis of the applied prior art references, Applicants hereby repeat the Abstract of the Disclosure of each of *Shiraishi*, *Haga*, and *Worster et al.*, as follows:

Shiraishi discloses illuminating light at a pupil plane of an illumination optical system for illuminating a position detection mark on a substrate. The illuminating light is limited to an annular area centered at an optical axis, and a member substantially blocks an image-forming light beam distributed over an area on a pupil plane of an image-forming optical system for forming an image of the position detection mark on an imaging device by receiving light generated from the mark. The area is in image-forming relation to the annular

area on the pupil plane of the illumination optical system. Alternatively, a member gives a phase difference of approximately $\pi/2$ (rad) between the image-forming light beam distributed over the area which is in image-forming relation to the annular area on the pupil plane of the illumination optical system and the image-forming light beam distributed over the area other than that area.

Haga discloses an apparatus for inspecting the surface condition of an object which comprises a light source, an optical element for directing irradiating light from the light source to an object and for converging the light reflected by the surface of the object at its back focal plane to form an image behind the back focal plane, and an observing apparatus for observing the image. An aperture stop is arranged at or near the back focal plane to cut off a scattered component of the reflected light. A half mirror having two planes forming a predetermined micro angle each other deflects the reflected light from the optical path of the irradiating light.

Worster et al. disclose a laser imaging system which is used to analyze defects on semiconductor wafers that have been detected by patterned wafer defect detecting systems (wafer scanners). The laser imaging system replaces optical microscope review stations now utilized in the semiconductor fab environment to examine detected optical anomalies that may represent wafer defects. In addition to analyzing defects, the laser imaging system can perform a variety of microscopic inspection functions including defect detection and metrology. The laser imaging system uses confocal laser scanning microscopy techniques, and operates under class 1 cleanroom conditions and without exposure of the wafers to operator contamination or airflow. Unlike scanning electron microscopes (SEMs) that have previously been used for defect analysis, the laser imaging system will not damage samples or slow processing, costs significantly less to implement than an SEM, can produce a three

dimensional image which provides quantitative dimensional information, and allows sub-surface viewing of defects lying beneath dielectric layers. The laser imaging system is adaptable to cluster or in-situ applications, where examination of defects or structures during on-line processing can be performed.

None of *Shiraishi, Haga, and Worster et al.*, either alone or in combination, teach or suggest, as is now recited in independent method claims 5, 11, and 12, that an angle at which a difference from the normal position is obviously observed with the naked eye is selected, and bright-field illumination is used when the angle is zero degrees and dark-field illumination is used when the angle is an angle other than zero degrees.

More particularly, the present invention relates to a surface inspection method which enables the measurement of surface conditions of automobile parts, OA apparatus, household electric appliances, or similar. In the fields of trim parts of automobiles, OA, domestic electrification, and in particular, in products made of synthetic resins, the physical properties of the surfaces of products concerning their external appearances, in concrete terms, injuries, unevenness in height, unevenness in gloss, unevenness in color, the external appearance of a weld line, the external appearance of flow marks, stress whitening, and so forth, have a great deal to do with determining their commodities value.

The surface condition of such a product is hitherto appraised by performing a sensation test, in which a classification is made on the basis of eye observation. In the sensation test, however, minute information about the surface condition, i.e., information at the same level as a state of seeing with the naked eye, cannot be preserved. A surface inspection method in which the surface condition of a product or a material can be accurately evaluated or measured has earnestly been desired.

The present invention has enabled superior detection results correlated with eye observation results.

On the other hand, *Shiraishi* relates to a position detecting apparatus which is capable of accurately and reliably detecting the position of a position detection mark on a wafer surface, even a mark having an extremely small height difference (i.e., step) between recessed and projecting portions which contribute to the mark.

Specifically, *Shiraishi's* apparatus deals with the position detection mark which is not able to be detected with the eye observation, while the apparatus of the present invention deals with the injuries, unevenness in height, unevenness in gloss, unevenness in color, and similar, which are observed upon observation by one's eyes.

Thus, the object of the present invention and the field wherein the present invention is used, are quite different from that of *Shiraishi* and *Shiraishi, Haga, and Worster et al.*, either alone or in combination, do not render obvious amended claims 5, 11, and 12 and non-amended claims 7 and 8, either directly or indirectly dependent upon amended claim 5, of this application.

Applicants respectfully submit that the amendments to claims 5, 11, and 12 do not add any new matter. Applicants also respectfully submit that claims 7 and 8 are either directly or indirectly dependent upon amended claim 5 so that arguments serving to patentably distinguish amended claim 5 from the prior art of record are available, among others, to patentably distinguish claims 7 and 8. Based on the foregoing, Applicants request withdrawal of the rejection of claims 1, 4, 9, and 10 under 35 U.S.C. § 103(a) as not being unpatentable over *Shiraishi* as being moot since claims 1, 4, 9, and 10 have been canceled, without prejudice and disclaimer, withdrawal of the rejection of claims 5, 7, 8, 11, and 12

under 35 U.S.C. § 103(a) as being unpatentable over *Shiraishi* and *Haga* and *Worster et al.*,
and allowance of claims 5, 7, 8, 11, and 12.

In view of the present amendment, claims 5, 7, 8, 11, and 12 are believed to be in
condition for allowance, and an early and favorable action to that effect is respectfully
requested.

Respectfully submitted,

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